



# **OMPS**

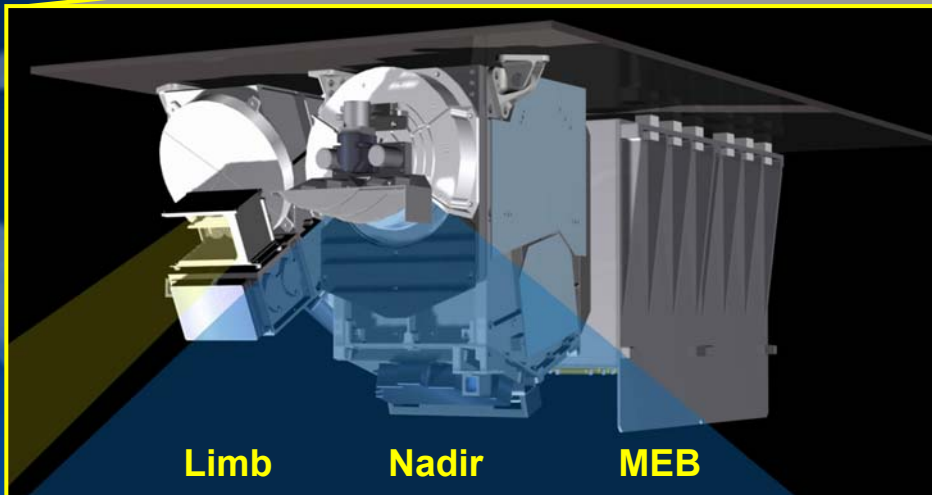
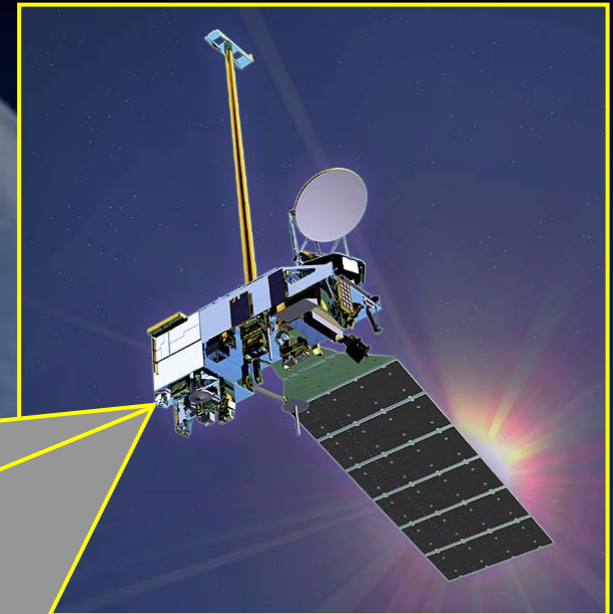
## **The Next-Generation Sensor Suite for Global Ozone Monitoring**

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**OMPS Program Manager**  
**Ball Aerospace & Technologies Corp.**

**September 20, 2004**

# OMPS Consists of Flight Hardware & Software and Ground Data Processing Algorithms

- *Flight Hardware for NPP & NPOESS*
  - *Nadir Sensor*
    - » *Total Column Spectrometer (TOMS Heritage)*
    - » *Profiler Spectrometer (SBUV/2 Heritage)*
  - *Limb Sensor*
  - *Main Electronics Boxes (dual redundant)*
- *Flight Software*
- *Nadir & Limb Algorithms*



- *OMPS Data Products*
  - *Total Ozone Column*
  - *Limb Ozone Profile*
  - *Nadir Ozone Profile*
  - *IR Total Column*
  - *Calibrated Radiances*

# The OMPS Mission Will Satisfy The NPOESS Ozone Total Column / Profile EDR

- *Provide global maps every 24 hours of the amount of ozone in a vertical column of the atmosphere*

Measurement Parameter	Requirement
Horizontal cell size	50 km @ nadir
Range	50 - 650 Dobson Units (milli-atm-cm)
Accuracy	15 DU or better
Precision	3 DU + 0.5% total ozone or better
Long-term stability	1% over 7 years or better

- *Provide profiles of the volumetric concentration of ozone in specified segments of a vertical column of the atmosphere with a 4 day revisit*

Measurement Parameter	Requirement
Vertical cell size	3 km
Horizontal cell size	250 km
Vertical coverage	Tropopause height to 60 km
Range	0.1 - 15 ppmv
Accuracy	Greater of (20%, 0.1 ppmv) below 15 km Greater of (10%, 0.1 ppmv) above 15 km
Precision	3%, 15-50 km; 10%, TH-15 and 50-60 km
Long-term stability	2%

# Nadir Sensor Overview

- **Purpose**

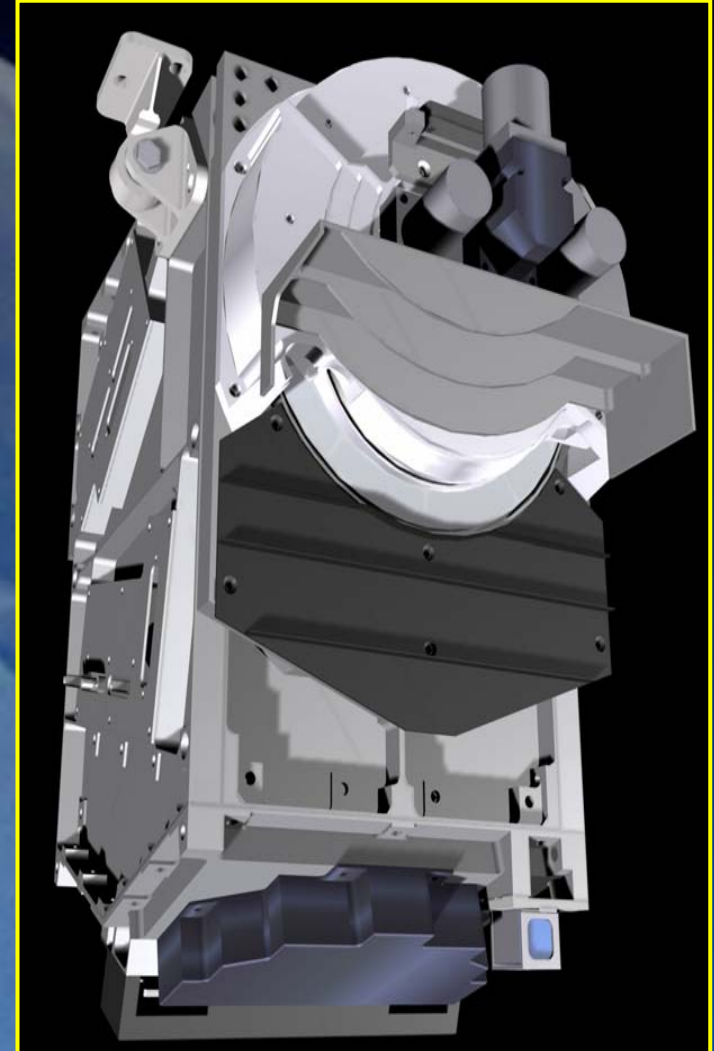
- Provides total column ozone data with 50x50 km resolution at nadir
- Provides ozone profiles in a single ground pixel of 250x250 km at nadir

- **Configuration**

- Push broom 110° cross-track FOV telescope
- Two grating spectrometers
  - » Total column covers 300 nm to 380 nm
  - » Profiler covers 250 nm to 310 nm
- CCD optical detector for each spectrometer
- Reflective calibration diffuser

- **Operation**

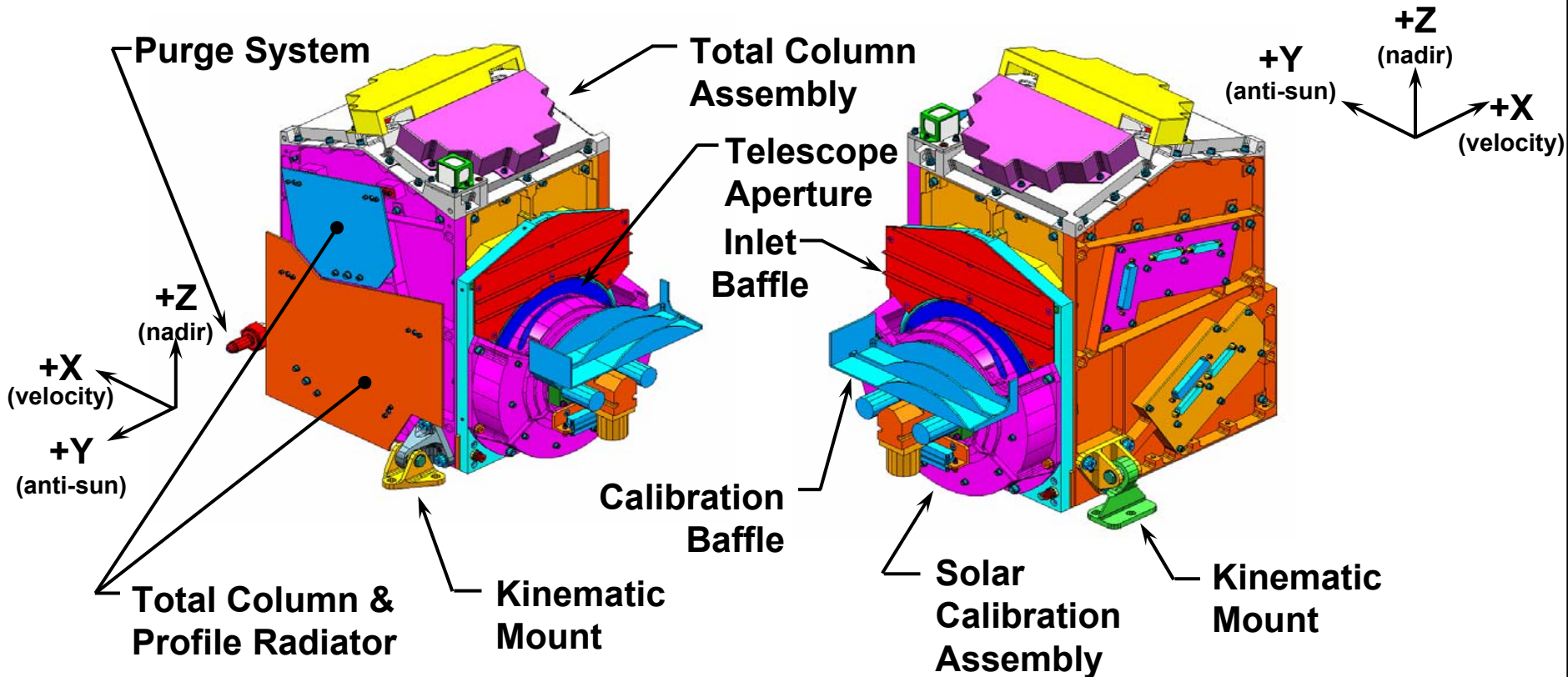
- Backscattered solar ultraviolet radiation is dispersed and measured to determine ozone total column amounts & profile concentrations
- Calibration stability maintained by periodic solar observations





# Nadir Sensor Mechanical Overview

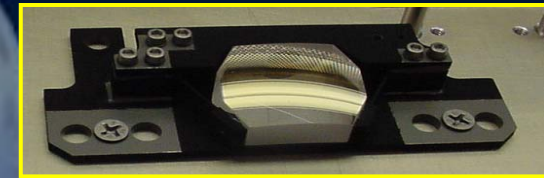
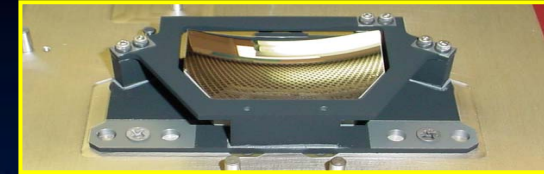
Stiff, low mass, titanium structure with titanium optic mounts



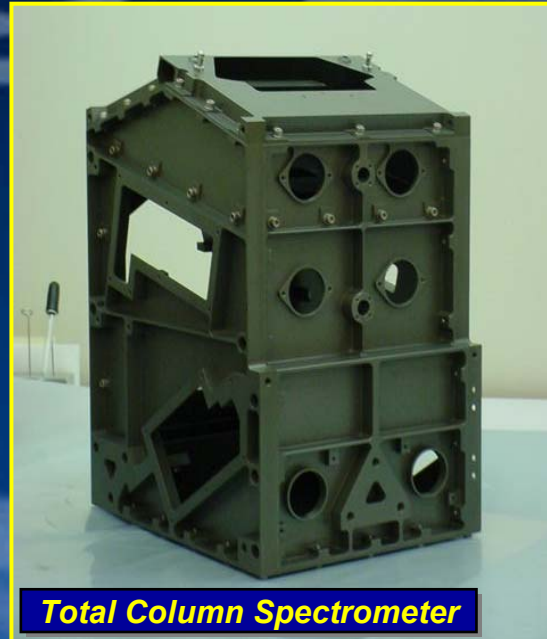
Kinematic mounts accommodate thermal and material differences between sensor and spacecraft

# Nadir Sensor – PFM Production Status

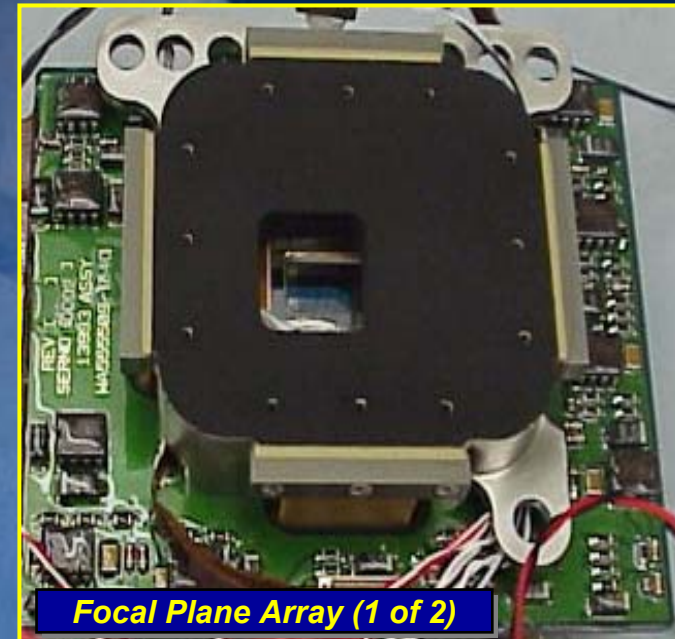
- *Profiler Assembled & Ready For FPA Integration*
  - Settling vibe and thermal cycle complete
- *Total Column Assembled & Ready For FPA Integration*
  - Settling vibe and thermal cycle complete
- *Telescope In Final Assembly & Alignment*
- *Focal Plane Completion Scheduled for October*



**Profiler Spectrometer**



**Total Column Spectrometer**

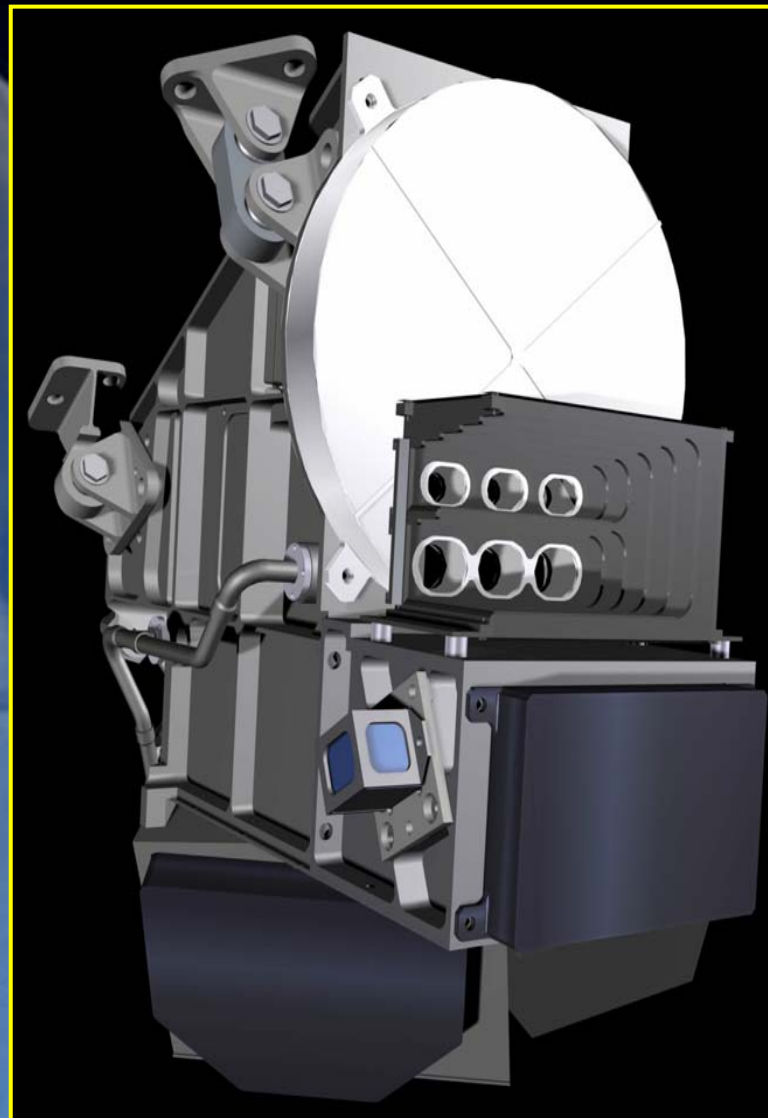


**Focal Plane Array (1 of 2)**



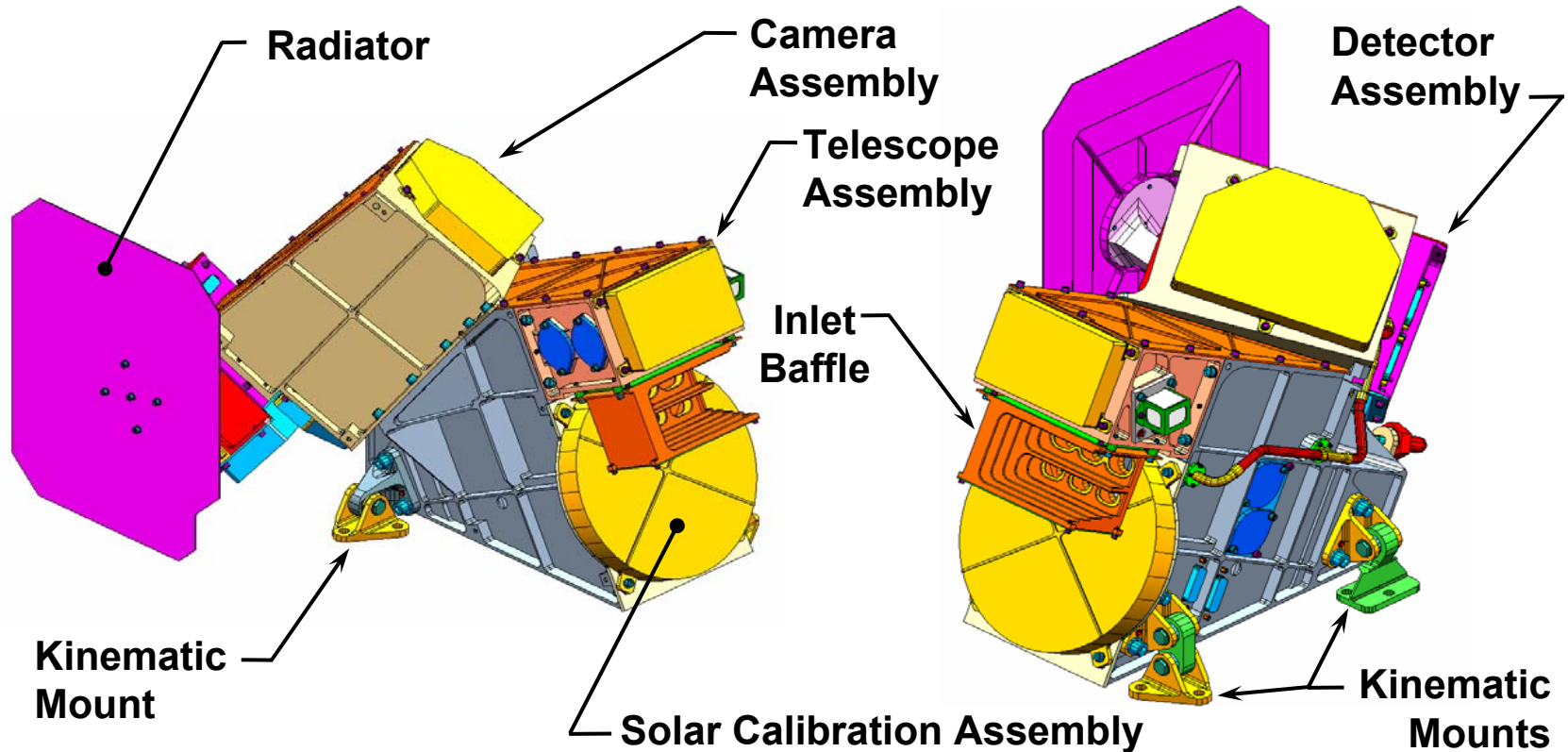
# Limb Sensor Overview

- **Purpose**
  - Provides 3 km vertical resolution profiles of atmospheric radiance with channel spectral resolutions from 2.7 nm UV to 35 nm NIR
- **Configuration**
  - Afocal telescope with three  $2.23^\circ$  vertical FOVs separated cross-track by  $4.25^\circ$
  - Single prism spectrometer covering 290 nm to 1050 nm
  - CCD-based optical detector
  - Dual transmissive calibration diffusers
- **Operation**
  - Limb-scattered solar radiation is measured to determine ozone profile concentrations for the altitude range of 8 to 60 km
  - Calibration stability maintained by periodic solar observations



# Limb Sensor Mechanical Overview

Stiff, low mass, titanium structure with titanium optic mounts

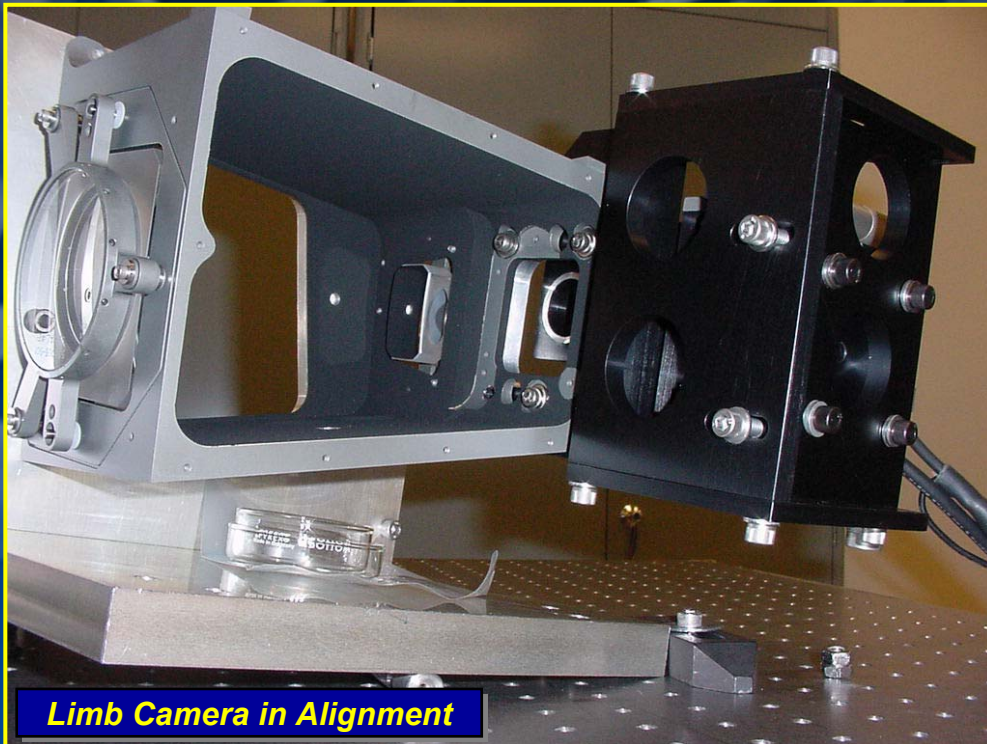


Kinematic mounts accommodate thermal and material differences between sensor and spacecraft

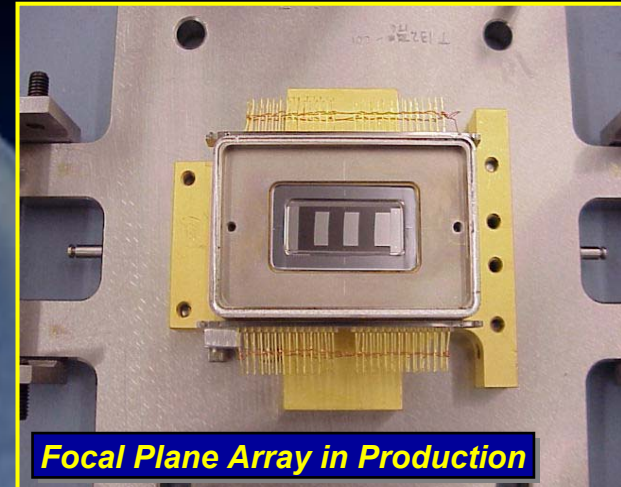


# Limb Sensor – PFM Production Status

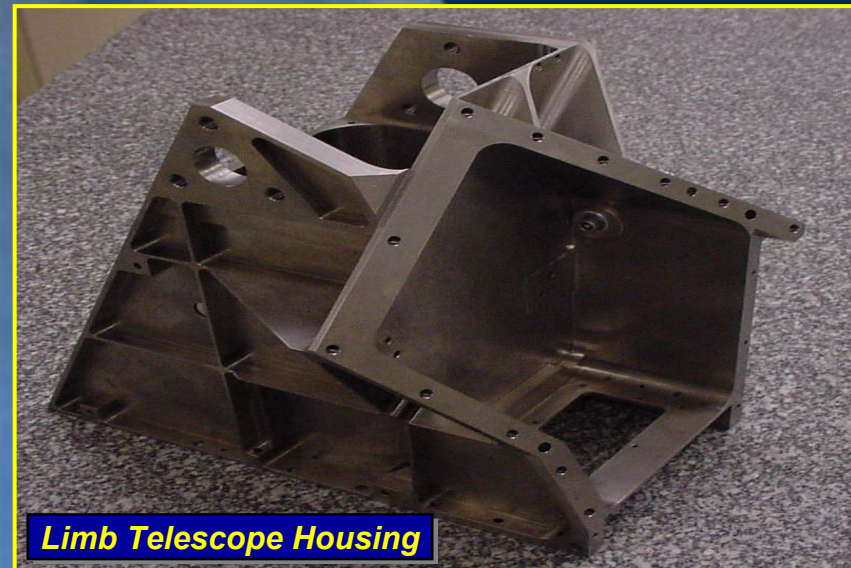
- *Camera Assembled & Awaiting Sensor Integration*
- *Telescope In Final Assembly & Alignment*
- *Focal Plane Completion Scheduled For October*



**Limb Camera in Alignment**



**Focal Plane Array in Production**

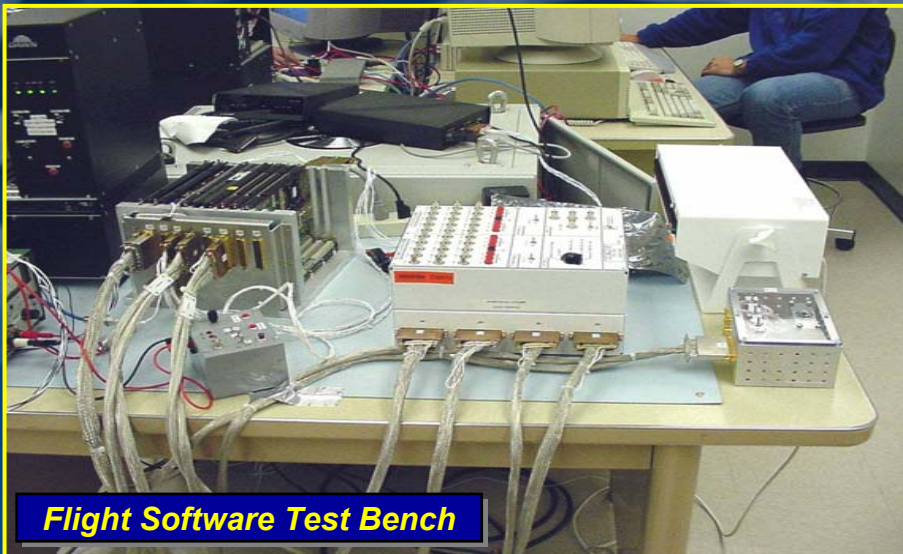
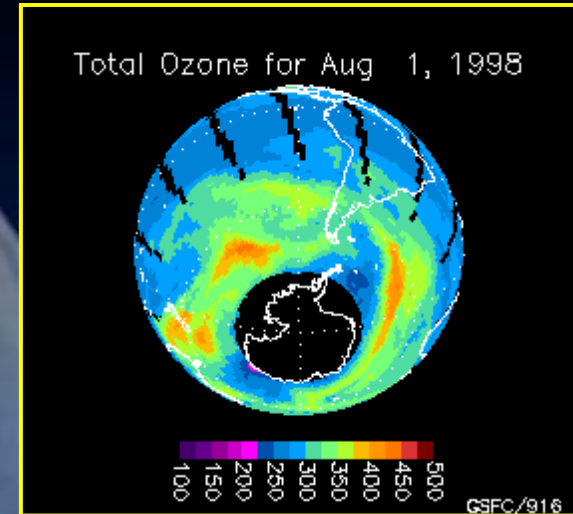


**Limb Telescope Housing**

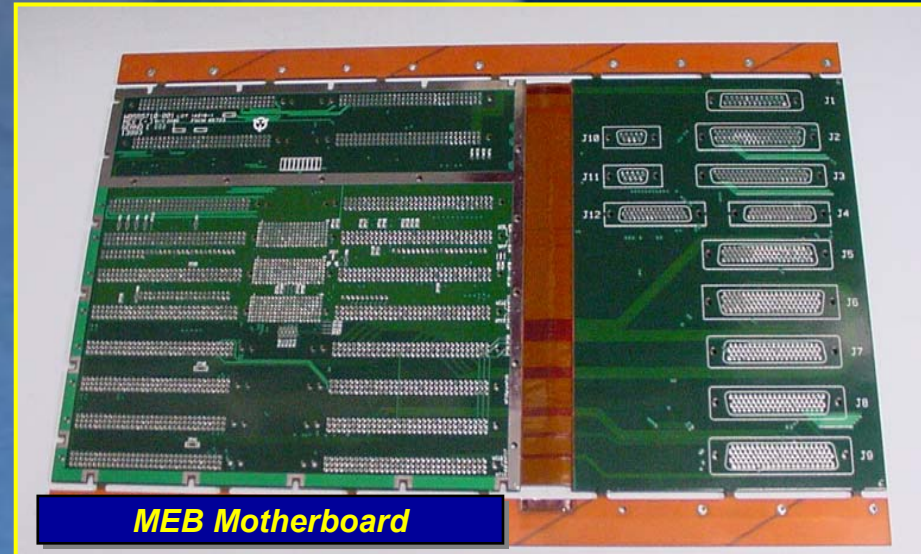


# Electronics, Software and Algorithm Status

- *Main Electronics Box (MEB) PFM Hardware*
  - Housing A&B machined
  - Board-level production & test nearing completion
  - MEB integration & test begins in November
- *Flight Software (FSW)*
  - Formal Qualification Testing (FQT) in progress
- *Ground Data Processing Algorithms*
  - Nadir and Limb algorithm science-grade code delivered

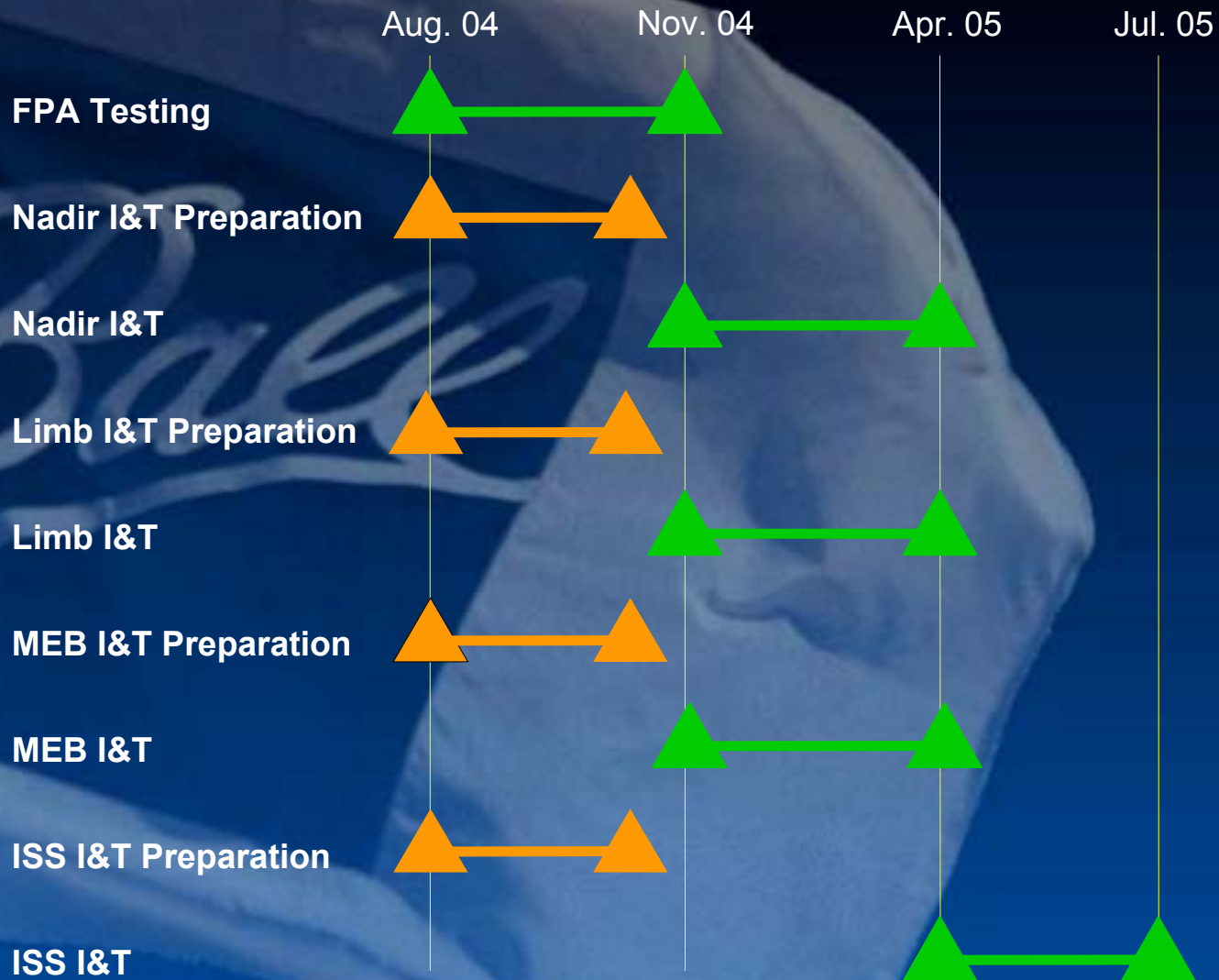


**Flight Software Test Bench**



**MEB Motherboard**

# PFM Integration and Test Schedule





## Conclusions

- *OMPS Will Satisfy NPOESS's Total Column/Profiler EDR*
- *OMPS PFM Will Fly On The NPOESS Preparatory Project*
  - *Delivery to NPP summer 2005*
  - *NPP launch fall 2006*

